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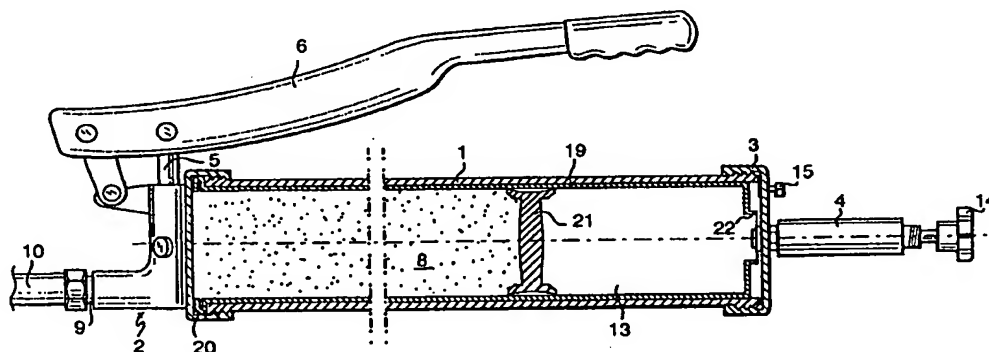
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(21) International Application Number: PCT/IT00/00049 (22) International Filing Date: 18 February 2000 (18.02.00) (30) Priority Data: RM99U000035 1 March 1999 (01.03.99) IT (71)(72) Applicant and Inventor: TOTARO, Luigi [IT/IT]; Corso Vittorio Emanuele, 120, I-66041 Atesa (IT). (74) Agents: BANCHETTI, Marina et al.; Ing. Barzano' & Zanardo Roma S.p.A., Via Piemonte 26, I-00187 Roma (IT).			(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>

(54) Title: **CARTRIDGE FOR MANUAL LUBRICATOR WITH LEVER OPERATED GREASE PUMP**



(57) Abstract

Cartridge for manual lubricator with lever grease pump and rear compressed air chamber, comprising a tubular housing (19), having such a diameter to be housed within the tubular container (1) of said lubricator, having a first completely opened end, to be faced during the use toward the head (2) of the lubricator, provided with a sealing annular edge (20) outwardly projecting and having a width sufficient to overlap with the extreme edge of said tubular container (1), and having a plunger element (21), slidably provided within the same and making sealing on both faces, which, being placed, when the cartridge is full, in correspondence of the second end of said tubular housing (19), also acts as bottom closure element, co-operating with said second end of the tubular housing (19), which is provided with one or more openings (22).

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CARTRIDGE FOR MANUAL LUBRICATOR WITH LEVER OPERATED GREASE PUMP

5 The present invention concerns a cartridge for manual
lubricator with lever operated grease pump. More specifically, the
invention concerns a cylindrical cartridge structure for pressure lubricator
of the pump kind, particularly studied to be used in devices of the above
kind wherein the conventional helicoidal spring for rear compression is
replaced by a compressed air sealed chamber realised in the rear end of
10 the lubricator, preferably maintained under pressure by a little manual
alternative air compressor, built in said rear end. As it is well known,
grease pump manual lubricators, also known as syringe lubricators, are
hand devices to

under pressure highly viscous lubricant material, substantially
15 comprised of a cylindrical container with a reserve of said material and of
a delivering reciprocating pump, which can be manually operated by a
lever fixed on the head of the device and connected by its the suction with
the cylindrical container and having its delivery connected with a delivering
nozzle provided on the front end of the lubricator.

20 In the conventional syringe kind manual lubricators, a plunger
thrusting element operated by a helicoidal compression spring is present,
provided within the rear part of the tubular container, said thrusting
element compressing the grease mass contained within the container
toward the head, so as to help the product, which usually is very viscous,
25 to outflow through the delivering end of the device. Before filling the
container with the grease (or introducing within the same a suitable
cartridge, in case of devices working with cylindrical packaged charges
available on the market) the compression spring is charged by a suitable
tie rod, coaxial with respect to the same, engaging at one end with the
30 thrusting element and exiting, with the other handle or hook shaped end,
from the rear part of the lubricator. Once carried out this operation and
blocked the spring in the maximum compression position, lubricator can
be filled in with loose grease or with the cartridge introducing one or the
other one within the tubular container through the front opening, from
35 which the head has been previously removed.

Since grease pump manual lubricators of the above mentioned
kind has a series of working difficulties essentially connected with the use
of spring mechanical means as pressure source to push the grease of the

cylindrical container toward the head, it has been suggested to provide the rear thrust to the mass housed within the tubular container by means different with respect to the spring – tie rod assembly. Particularly, an alternative solution with respect to the use of the spring is that of operating the rear thrusting element by compressed air, which is realised in a very functional way in the lubricator object of the published international patent application N° WO 97/32156, of the same Applicant. According to the solution described in the above application, which is herewith incorporated by reference, a manual lubricator of the syringe kind is provided on the rear of a plunger thrusting element having a seal on both faces, i.e. of double effect kind, that, when operated by compressed air, obtained in the rear chamber of the tubular container thanks to a little alternative compressor built in the same lubricator. The compressor can be used operating it like a bicycle pump, to bring the rear chamber of the container at the desired pressure and to establish some times said pressure level when the grease is consumed and the thrusting element advances toward the head. The use of a double effect plunger as thrusting element is necessary since it not only must push the grease in the direction of the head but also must be sealed with respect to compressed air pressing on its face opposite to the one contacting the grease.

Thanks to the use of the air compressor, in the rear chamber of the lubricators according to the application N° WO 97/32156 even very high pressure levels can be reached with very low efforts, the preferred level being in any case about 2-3 atm. With such thrust from the bottom on the grease mass, well higher than the thrust that can be provided by a spring charged at its maximum with a total of 15-20 kg, grease enters much more easily within the suction chamber of the pump. Consequently, eventual sealing losses of the same pump due to the wear of its piston, that normally involve a reduction of functionality of the same pump since it passes to intake outer air, in case of the described device can at most become an outward loss of very little amount of grease (through the defective seals), but lubricator in any case still works regularly.

The above mentioned document suggests the described lubricator both to be used with loose grease and with grease cartridges, and in this last case it generically refers to the commercial cartridges already used for conventional lubricators having a compression spring. The model described in the same document for the cartridge mode is here

illustrated, for comparison, in the enclosed figures 1 - 3, to which reference will be made to illustrate the prior art.

As shown in figure 1, representing a view of the lubricator with some element in longitudinal section and others not sectioned, the device is comprised of a cylindrical container 1, a head 2 and a rear cover 3, on which a alternative compressor 4 is mounted. Head 2, which is not sectioned, is of the conventional kind, with a manual alternative pump the piston 5 of which is operated by the lever 6. Intake of the pump communicates with the whole environment of the cylindrical container 1 wherein the cartridge 7 with grease 8 is provided, while its delivery communicates through a one way valve with the grease delivering nozzle 9, on which it is normally threaded a flexible tubular adapter 10 (partially represented) for the connection with the apparatus to be greased. A plunger thrusting element 11 (shown alone in figure 3) is contained within the cylindrical container 1, provided with O-rings 12 for sealing on both faces. During its working, the thrusting element 11 moves sliding within the cartridge 7 and with a face urges on the grease 8, while the other one is subjected to the pressure realised by the alternative compressor 4 in the rear chamber 13 of the lubricator included between the thrusting element 11 and the rear cover 13. Acting on the knob 14, compressor 4 can be operated for example at the same way of a bicycle pump, and the desired pressure level can be established within the rear chamber 13 of the lubricator, being it possible to restore said level sometimes pumping when the grease 8 is depleted and the thrusting element 11 moves towards the front end of the cylindrical container 1. In case it is wished to lower the pressure level reached within the rear chamber 13, for example when it is wished to discharge the pressure before opening the lubricator, it is possible to act on the screw relief valve 15 provided on the rear cover 3 of the lubricator.

Application N° WO 97/32156 shows, also in detail, the structure of the standard cartridge 7 that was suggested to be used with the new lubricator (see enclosed figure 2). It is comprised of a tubular container closed on both ends, made up of plastic material and filled with lubricant grease, having a normally snap closed cylindrical cover 16, on the side of the cartridge rearwardly directed with respect to the lubricator, and a bottom 17 integrally realised with the tubular section of the cartridge 7, that, before its use, is perimetally cut and eliminated. Usually, within the

cover 16 a sharp projection is provided that can be used to separate the bottom 17, applying the cover 16 on the same and making it rotating in such a way that the sharp element perimetally acts on the bottom 17. For its loading, before introducing the cartridge 17, without its bottom parts within the cylindrical container, thrusting element 11 is introduced within the cylindrical wall of the same, from the part that will be directed during its operation toward the rear cover 2. As it is shown in figure 2, cartridge 7 is provided with a little perimetral projection 18 on the side that during its use will be faced toward the head 2, having the aim of providing an abutment for the introduction of the cartridge 7 within the lubricator. At the end of a cycle, when all the available grease 8 will be delivered, the plunger thrusting element 11 will have moved, sliding within the cartridge 7, up to the front end of the same, and it will be possible to recover the same from the emptied cartridge.

Even if the same document under examination suggests the theoretical opportunity of providing different cartridges with respect to those presently available on the market, wherein a piston element like the thrusting element 11 is already built in the cartridge in order to avoid any contact of the operator with the grease contained within the cartridge, the description does not contain any further detail about the same.

In the following tests on the cartridge lubricator described in the above, it has been noted that the use of commercially available cartridges of the above kind is not suitable for the peculiarities of the new compressed air lubricator, first of all because the system with the known cartridges is not airtight. This feature involves, on one side, that the pressure created by the air compressor 4 within the inner rear chamber 13 can reduce due to losses directed outward, particularly due to the air passage between the cartridge 7 and the inner wall of the tubular container 1, and thus through the closure of the heads 2. On the other hand, and in a still critical way, when an intake stroke of the piston pump 5 creates a depression, air can penetrate within the head, passing through the threaded closure of the same and thus causing a functionality reduction of the pump.

In view of the above, the present invention has the object of providing a new charge cartridge for syringe lubricators of the compressed air kind described in the above allowing to avoid the above mentioned drawbacks, contributing to the hermetical sealing of the lubricator and

avoiding that the alternative pump is idling due to infiltrations of air losses. To this end, it is suggested according to the invention, an arrangement for a cartridge wherein a sealing annular edge is present on the part faced during its use toward the lubricator head, suitable not only to abut on the edge of the lubricator tubular container, but also to engage with a certain thickness between said edge and the inner part of the threaded cover of the head, in such a way to provide a perfect seal between the cylindrical container of the lubricator and the head due to threading coupling between the two.

Further, according to the invention, it is suggested to provide the cartridge of a built in double effect plunger, also acting as sealing rear closure for the cartridge, avoiding the use of a second cover and the need of making particular operations to open the same cartridge.

It is therefore specific object of the present invention a cartridge for manual lubricator with lever grease pump and rear compressed air chamber, comprising a tubular housing, having such a diameter to be housed within the tubular container of said lubricator, having a first completely opened end, to be faced during the use toward the head of the lubricator, provided with a sealing annular edge outwardly projecting and having a width sufficient to overlap with the extreme edge of said tubular container, and having a plunger element, slidably provided within the same and making sealing on both faces, which, being placed, when the cartridge is full, in correspondence of the second end of said tubular housing, also acts as bottom closure element, co-operating with said second end of the tubular housing, which is provided with one or more openings,

Since the cartridge with the grease must be subjected, during the use, to the action of compressed air fed from the rear by the compressor, it is necessary that when it is installed within the lubricator, its rear end is opened. Thanks to the presence of the built in double effect thrusting element, which is per sé a sealing element, it can be realised a structure that, at least on the rear part, does not require to be opened before its use, for example eliminating a cover, but has a bottom already provided with openings to allow its communication with the compressed air chamber, and, at the same time, can contain the grease without losses and without the need of other packaging elements. In fact, it is sufficient that the bottom partially opened is provided with simple stopping or edge

elements to prevent to the plunger to outcome, and this will also act as rear closure of the cartridge.

Width of the annular edge on the front end of the cartridge is such to allow a good overlapping with the edge of the lubricator cylindrical container , in such a way that said edge does not act only as abutment for the introduction of the cartridge within the lubricator, but is squeezed as a gasket between the cylindrical container and the head when they are connected each other, normally by the threaded coupling.

Cartridges according to the invention must be filled in with grease exactly up to the edge of the tubular housing, at the level of the O-ring edge, since during the mounting on the lubricator air bubbles must not remain between the grease mass and the head with the alternative pump. Obviously, the opened end of the cartridge will be provided with a closure, for example a pressure or snap cover or plug, or a simple cap made up of flexible plastic material sheet which is kept about the edge by an elastic ring, allowing a practical storing and transportation of the full cartridges and, at the same time, an easy and fast opening before its use. To this end, it is very important, as it will be more evident in the following that the closure system does not modify in any way the perfect integrity of the annular sealing edge of the cartridge, since it would mean a defect of the hermeticity of the cartridge during the operation of the lubricator.

Further constructive and functional features of the cartridge according to the invention are set forth in the enclosed claims. Said features, as well as the advantages of the invention will be more evident making reference to a preferred embodiment, shown for illustrative but not limitative purposes in the enclosed drawings, wherein:

figure 1, already discussed, is a longitudinal section view, with some elements not sectioned, of a cartridge lubricator according to application N° WO 97/32156;

figure 2 is a lateral elevation view of a conventional cartridge suggested to be used with the lubricator of figure 1;

figure 3 is a lateral elevation view of the plunger thrusting element of the lubricator of figure 1;

figure 4 is a lateral elevation view of a cartridge according to the invention with closure cover;

figure 5 is a longitudinal section view of the cartridge of figure 4, without cover; and

figure 6 is a partially interrupted longitudinal section view, and with some elements not sectioned, of a cartridge lubricator according to the application N° WO 97/32156, on which the cartridge according to the invention has been mounted.

5 As shown in the already described figures 1 – 3, the system with cartridge 7 of the prior art provides the main drawback of not being airtight, making it practically impossible to be used, and the further disadvantage to be necessary to require, beyond the manual operation of opening the cartridge on both sides, also the introduction of the plunger 11
10 of the cartridge 7 housing after its opening.

 Cartridge according to the invention, shown in figures 4 and 5, completely eliminates the airtight drawback thanks to the presence of the tubular housing 19 of the annular edge 20, which not only abuts against the extreme edge of the tubular container 1 of the lubricator (as shown in
15 figure 6), but is also enough thick and width (in a radial direction) to interpose as a gasket between said extreme edge and the head 2 of the lubricator. In the embodiment shown in the figures, wherein the housing 19 is made up of relatively stiff plastic material, sealing capability of the annular edge 20 is increased by its one loop flexible bellows structure,
20 making it possible that the edge 19 perfectly adheres to any irregularity of the two surfaces between which it is interposed with a gasket function. Another advantage of the bellows arrangement (that however could also have a bigger number of loops or pleats) is that of being possible to much more easily realise the housing 19 by moulding, that would not be possible
25 if the edge 19 is a flat ring with a thickness notably bigger than the thickness of the other parts of the housing 19. It is well evident that, on the basis of the choose of the materials to realise the tubular housing 19, it could be possible or convenient that the edge 19 is a bulk flat ring, for example provided with an intrinsic elasticity.

30 On the opposite side of the sealing annular edge 20, figures 4 and 5 show a double effect plunger 21, i.e. with a sealing on both faces, replacing the thrusting element 11 of figures 1 and 3. In this case, plunger 21 is a disposable element already built in the cartridge according to the invention, that can be realised by techniques and materials sufficiently
35 cheap to justify the elimination of the same along with the housing of the empty cartridge. In the embodiment, plunger 21 is realised as a single piece with a flexible elastomeric material, and with such a shape to have

two grease and gas sealing edges against the inner walls of the tubular housing 19. To avoid that under the pressure exerted by the compressor 4 in the rear chamber 13 of the lubricator, plunger 21, warping, can create a bulging of the tubular wall of the housing 19, with the consequent risk of sealing loss of the same plunger 21, it is suitable that the tubular housing 19 has a diameter close to the inner diameter of the tubular container 1 (unless of a suitable clearance).

In order to use the plunger 21 also as bottom wall of the full cartridge, exploiting its sealing capability, the second end of the cartridge must be simply provided with stop means preventing the plunger 21 to exit from the rear part of the cartridge. In fact, it is evident that in this case it is not necessary a bottom cover that could in any case be removed before the use to allow the passage of the compressed air within the working lubricator, as shown in figure 6. A solution, simple under a constructive point of view, to obtain a rear abutment for the plunger 21 without closing the bottom of the cartridge, is that of providing an annular edge or relief on the bottom projecting inwardly, with an opening 22 creating a central hole. Obviously, any shape and number of openings can be provided on the tubular housing 19.

To void that air bubbles are present between the grease mass 8 and the piston alternative pump 5, cartridge according to the invention must be filled in with grease exactly up the edge, i.e. at the level of the annular edge 20. This involves that any closure system of the front end of the cartridge should provide the opportunity of thermal expansion of the grease during the storing. Therefore, a pressure or snap cover 23 like the one shown (partially sectioned) in figure 4 must be very flexible and/or axially slidable, in order to allow the dilatation of the grease without interference. For this reason, a closure with a thermo-welded or glued plastic or metallic material lamina, could not be suitable for the specific object, unless it is very yielding. Furthermore, in this case presence of the grease can make it difficult the adhesion of the lamina on the annular edge 20. It must also be noted that the closure system must be chosen in such a way not to risk to modify the integrity of the annular edge 20, not to deteriorate its hermetical sealing capability during the use of the cartridge. A very simple closure system, that surely does not damage the annular edge 20, and that furthermore is very simple to be opened without any risk of contact with the grease, can be realised with a flexible film put as a cap

about the annular edge 20, for example with an elastic ring tightened about the tubular housing 19 just under the annular edge 20. Closure can be also completed by a seal adhesive band, to guarantee the grease source.

- 5 The present invention has been described for illustrative but not limitative purposes, according to its preferred embodiments, but it is to be understood that modifications and/or changes can be introduced by those skilled in the art without departing from the relevant scope as defined in the enclosed claims.

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CLAIMS

1. Cartridge for manual lubricator with lever grease pump and rear compressed air chamber, comprising a tubular housing (19), having such a diameter to be housed within the tubular container (1) of said lubricator, having a first completely opened end, to be faced during the use toward the head (2) of the lubricator, provided with a sealing annular edge (20) outwardly projecting and having a width sufficient to overlap with the extreme edge of said tubular container (1), and having a plunger element (21), slidably provided within the same and making sealing on both faces, which, being placed, when the cartridge is full, in correspondence of the second end of said tubular housing (19), also acts as bottom closure element, co-operating with said second end of the tubular housing (19), which is provided with one or more openings (22).

2. Cartridge according to claim 1, wherein said sealing annular edge (20) has the shape of a flat ring.

3. Cartridge according to claim 1, wherein said sealing annular edge (20) has the shape of a bellows flexible annular, provided with one or more loops.

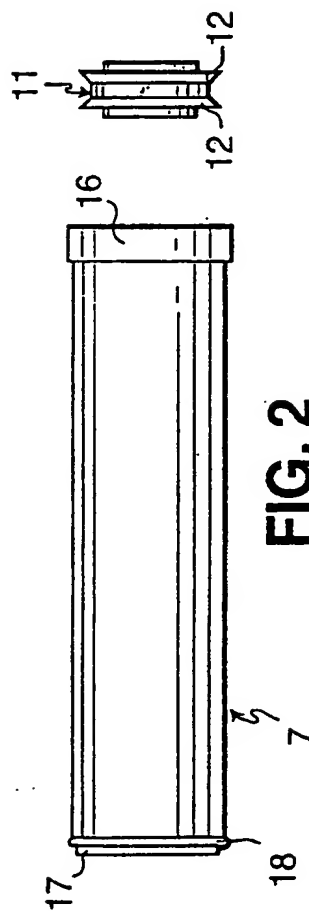
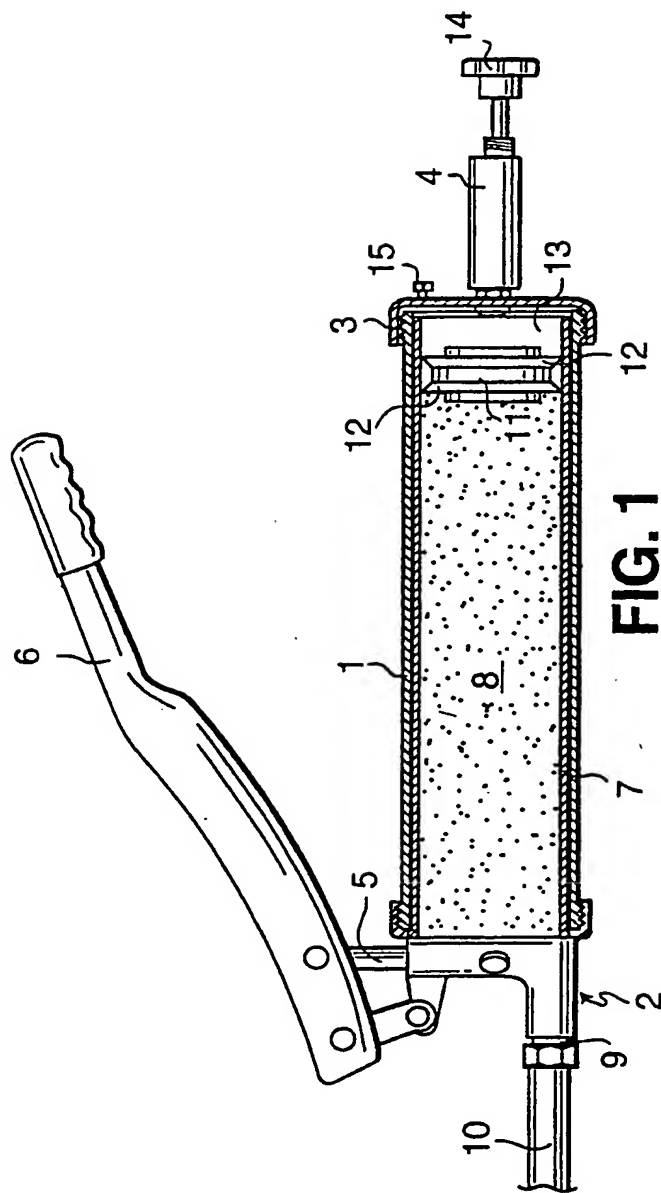
4. Cartridge according to each one of the preceding claims 1 - 3, further comprising a removable closure element for said first completely opened end of the tubular housing (19).

5. Cartridge according to claim 4, wherein said closure element is a flexible cylindrical cover (23) engaging on said annular edge (20) with such a clearance to allow displacements according to an axial direction of said cover (23).

6. Cartridge according to claim 4, wherein said closure element is sheet of flexible plastic material film kept like a cap about said annular edge (20) by an elastic material ring.

7. Cartridge according to each one of the preceding claims 1 - 6, wherein said one or more openings (22) are comprised of one single central hole on said second end of the tubular housing (19).

8. Cartridge for manual lubricator with lever operated grease pump and rear compressed air chamber according to each one of the claims 1 - 7, substantially as illustrated and described.



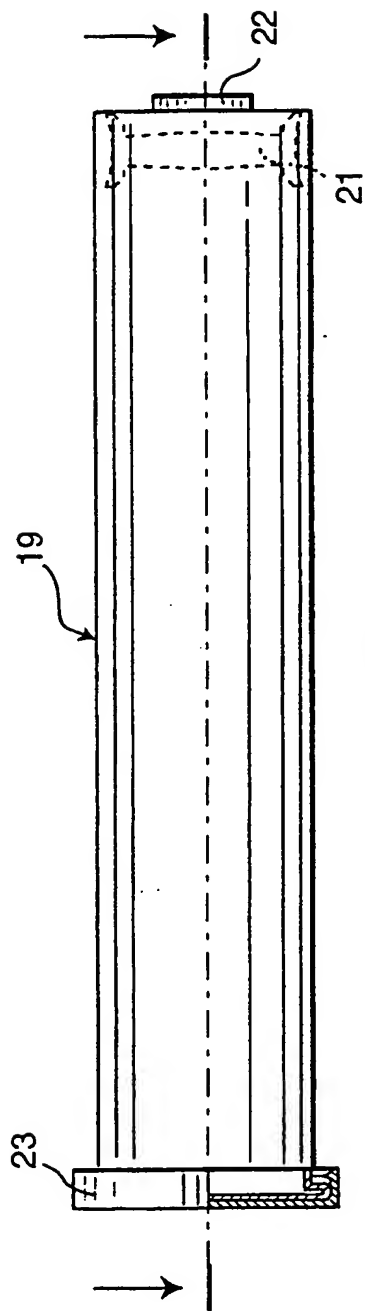


FIG. 4

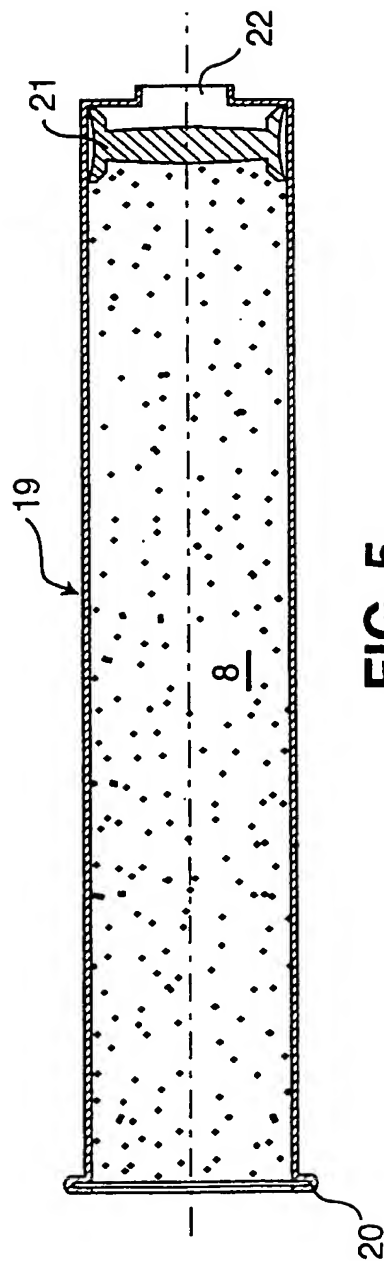
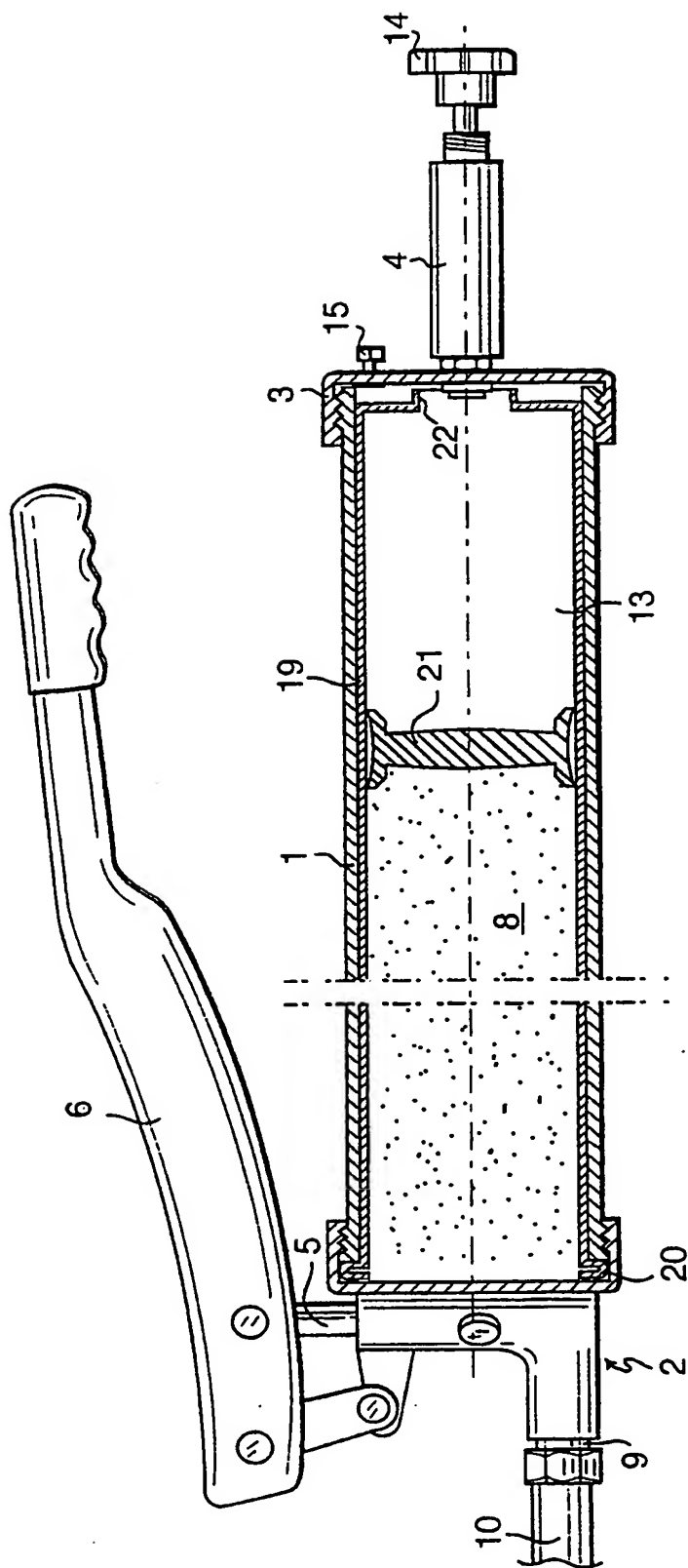


FIG. 5

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/IT 00/00049

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 F16N3/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 F16N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 97 32156 A (TOTARO LUIGI) 4 September 1997 (1997-09-04) cited in the application the whole document	1,3-5
Y	FR 2 078 573 A (CONSOLIDATED GLASS WORKS) 5 November 1971 (1971-11-05) page 2, line 23 -page 4, line 24; figures	1,3-5
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A	FR 1 410 571 A (STEWART-WARNER CORPORATION) 13 December 1965 (1965-12-13) figure 4	1
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International Application No
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C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 22 14 652 A (THE GREASE APPLIANCE CO LMTD) 5 October 1972 (1972-10-05) figures	1
A	FR 1 533 637 A (SUNDHOLM) 25 November 1968 (1968-11-25) figure 3	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IT 00/00049

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